

plant, together with their acquired experience and their sales organisations, largely account for the almost complete control which Germany has acquired in this branch of industry, and these are insuperable difficulties to be met by any competing nation unless really effective State-aid is guaranteed in the future.

The accompanying illustration (Fig. 1) from the *Little Journal*, for December, published by Messrs. A. D. Little, of Boston, Massachusetts, shows a typical German coal-tar colour factory. Some idea of the development of the German dye industry is afforded by the history of the Farbwerke Meister, Lucius und Brüning, which was organised in 1862 by two chemists and two merchants, with a staff of five workmen, one clerk and one chemist, and an engine of three horse-power. In 1912 7680 workmen, 374 foremen, 307 chemists, and 74 other higher technical officials were employed by this single firm, the wages paid out being 8·6 million marks, whilst 5·2 million marks were expended in salaries and bonuses. Eleven thousand different substances were manufactured, and the steam engines had a total horse-power of 30,000.

Closely wrapped up with the question of the manufacture of aniline dyes in Great Britain is that of the future of indigo in India, which is discussed in an article in the *Pioneer Mail* of January 8. It is here emphasised that during the past few years the indigo grown in Bihar and Orissa has been falling off in a remarkable way owing to the competition of the synthetic dye; whereas in 1913 63,100 acres were under indigo, the area grown this year is only 38,500 acres. Owing to the war, however, the price of natural indigo has rushed up enormously to more than 700 rupees per maund, a rise of about 300 per cent. on the normal price of the past three years. Thus the few indigo planters who were still producing indigo have been fortunate enough to make very large profits, and if they can continue or increase their production during 1915 they will be in an equally strong position. It is, however, difficult to estimate the ultimate effect of the war upon the indigo industry of India. There is no doubt that trade with Germany will be suspended for some time to come, and some time must also elapse before the manufacture of the synthetic dye can be established in France or England. Moreover, the use of natural indigo will probably be stimulated, owing to the increased requirements of the War Office and Admiralty, so that for some time to come the indigo planters will probably benefit considerably and make profits which will be some compensation for the lean years recently passed through. But there is little doubt that in the long run the synthetic dye, whether manufactured here or in Germany, will very largely supplant the natural material; it will be a repetition of the history of the madder industry. On this side of the question reference may be made to the lecture delivered recently by Dr. F. M. Perkin before the Society of Arts, and published in the *Journal* for January 1, and to the discussion which this paper evoked.

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METALS AND WAR.

CONSIDERABLE attention has recently been devoted to the internal resources of Germany as a producer of various metals, more particularly, of course, of such metals as play an important part in the manufacture of war material. It has been shown that the normal consumption in Germany of copper, for example, is about 250,000 tons yearly, whilst the production is only about 25,000 tons, of which 20,000 tons are produced from one mine alone, the well-known Mansfeld mine, so that the possibility of any great increase in the domestic production would appear to be remote. The bulk of the German copper is imported from the United States, which produces more than half of the world's supply of copper, amounting now to about one million tons per annum, so that in normal times Germany purchases about one half of the United States' output of copper. It is obvious that the American producers of this metal must be seriously affected by the loss of so very important a customer.

Although public interest has centred mainly upon copper in this connection, there are other metals of scarcely less importance in this respect; thus nickel is used in the manufacture of armour plate, of special steel for ordnance and numerous similar purposes, and for some purposes can even be used to replace copper, as in the casing of leaden bullets. Germany produces practically no nickel, but has to import all its requirements; it would appear that the imports of nickel and nickel ore, which latter is smelted in Germany, would represent between 5000 and 6000 tons of nickel, of which about 1500 tons is re-exported, so that the German consumption may be taken as approximately 4000 tons per annum, out of the world's total production of some 28,000 tons. Again, manganese is indispensable in steel manufacture. In round numbers, Germany produces about 85,000 tons of manganese ore, and imports normally 650,000 to 700,000 tons, the bulk of which comes from the Caucasus, so that Germany produces only about one-ninth of its normal requirements of manganese, and the cutting off of the supplies of this substance cannot but seriously affect its steel production.

NOTES.

IN answer to a question as to typhoid in the Army, asked in the House of Commons on February 8, Mr. Tennant, Under-Secretary of State for War, said:—"Of the 421 cases of typhoid in the present campaign among British troops 305 cases were in men who were not inoculated within two years. In the 421 cases there have been thirty-five deaths. Of these deaths thirty-four were men who had not been inoculated within two years. Only one death occurred among patients who were inoculated, and that man had only been inoculated once, instead of the proper number of times—namely, twice." This is a marvellous record; and no further answer than it provides is needed to the inhuman efforts made by anti-vaccina-

tionists to induce men to object to inoculation by which such protection is secured. Replying to some carping criticisms against inoculation made by Mr. Chancellor in the House of Commons on February 9, Dr. Addison pointed out that in the South African war there were 58,000 cases of typhoid—more than an Army Corps—whereas in our great force now in France and Belgium, and after six months, including three months of atrocious weather, there have only been 421 cases among our troops. The total losses in South Africa were 22,000, of which about 14,000 deaths were from diseases and 8000 of these were from typhoid. When we compare this immense sacrifice of human life from preventible disease with the record stated above, we can only wonder at the patience of the British people in permitting a prejudiced faction to urge men not to subject themselves to a treatment by which they save others and themselves from suffering and death.

PROF. G. O. SARS, professor of zoology, University of Christiania, has been elected an honorary member of the Challenger Society.

SIR W. WATSON CHEYNE will deliver the Hunterian oration at the Royal College of Surgeons, Lincoln's Inn Fields, on February 15, taking as his subject "The Treatment of Wounds in War."

DR. SIDNEY COUPLAND has been appointed Harveian orator (of the Royal College of Physicians) for 1915; Dr. J. Michell Clarke Bradshaw lecturer for 1915, and Dr. Samson G. Moore Milroy lecturer for 1916.

THE Secretary of the Admiralty announces that the King has approved the award of the Polar Medal to the officers and men who took part in the Australasian Antarctic Expedition of 1911-14, under the leadership of Sir Douglas Mawson.

It is announced in the issue of *Science* for January 29 that the city of Philadelphia, acting on the recommendation of the Franklin Institute, Philadelphia, Pa., has awarded the John Scott legacy medal and premium to Dr. C. E. Guillaume, of Sèvres, France, for the invention of his alloy invar.

ACCORDING to the *Southern Times* of February 6 the monument on the grave of the late Dr. Alfred Russel Wallace in the cemetery at Broadstone, Dorset, is a fine specimen of fossil tree from Portland, seven feet in height and weighing some two tons. The specimen stands on a foundation of Purbeck stone, and an inscription on it indicates merely Dr. Wallace's name and dates of birth and death.

DR. W. H. HADOW, principal of Armstrong College, Newcastle-upon-Tyne; and Engineer Vice-Admiral Sir Henry J. Oram, K.C.B., F.R.S., Engineer-in-Chief of the Fleet, have been elected members of the Athenæum Club, under the provisions of the rule which empowers the annual election by the committee of three persons "of distinguished eminence in science, literature, the arts, or for public service."

THE death is announced, in his fifty-eighth year, of Prof. L. L. Dyche, of the University of Kansas.

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He was a graduate of that institution, at which he was appointed in 1885 assistant professor of zoology, in 1886 professor of anatomy, in 1890 professor of zoology, and in 1900 professor of systematic zoology. He had made twenty-three scientific expeditions in various parts of North America, as well as Greenland and the Arctic regions, and had thereby secured for the University of Kansas one of the most valuable collections of mammals in the United States.

DR. BENJAMIN SHARP, who had charge of the department of zoology in Peary's first Arctic expedition, has died at Morehead, North Carolina, at the age of fifty-six. For a time he was professor of invertebrate zoology at the Philadelphia Academy of Natural Sciences, and afterwards at the University of Pennsylvania. He was then appointed corresponding secretary of the former institution, in whose interests he made collecting expeditions to the Caribbee Islands, Hawaii, and elsewhere. He was an industrious lecturer and writer on zoological subjects.

THE occurrence of frost-bitten feet among the troops has been reported from time to time. According to the *Morning Post*, February 5, Dr. Temoin, of Bourges, has investigated the subject, and concludes that the affection is not due to frost-bite, but is a gangrenous condition caused by arrest of the circulation through pressure, cold being a contributing but secondary factor. Wet causes the puttees to contract and retard the circulation, and the feet swell in consequence in the boots, which also somewhat contract. The remedy is to induce the soldiers frequently to take off their boots, and to reduce the period in the trenches.

IN a paper read before the Institution of Civil Engineers on February 9, Mr. F. D. Evans dealt with engineering operations for the prevention of malaria, as carried out in the Federated Malay States. Drainage is all-important, and an inexpensive and thoroughly efficient type of drain has been evolved to meet the conditions, formed of concrete blocks of half-egg shape, laid close but unjointed. The blocks are laid without foundations even on bad ground in flowing water. Should they move out of line or gradient, it is easy to re-set them correctly when the surrounding ground has settled, after which they give no trouble; but re-setting is rarely necessary.

A FEW weeks ago it was reported by cable that Sir Ernest Shackleton would not reach the base from which he intends to start his crossing of the Antarctic continent, in the Weddell Sea, in time to proceed this season. Letters and a diary now published in the *Daily Chronicle* confirm this. The ice has been very late in breaking. Sir Ernest now hopes to get away from the base at the beginning of November next, after wintering there. His present communications have come from South Georgia, and an interesting and useful piece of scientific work has already been done there in the erection of true meridian posts, which will enable whaling and other ships to test their compasses. The voyage to South Georgia appears to have been prosperous, and the expedition has

received an addition to its *personnel*, which must be unusual for a polar voyage, in the shape of a stow-away.

THE Calcutta correspondent of the *Morning Post*, in a communication dated January 7, states that the trustees of the Indian Museum, Calcutta, have addressed to the Government of India the following protest against the acts of vandalism perpetrated by the Germans in destroying Belgian museums and buildings of historical interest: "We, the office bearers of the Board of Trustees of the Indian Museum, desire to protest on behalf of our Board against the unnecessary destruction of libraries, art galleries, museums, and buildings of purely historical and artistic value in time of war. We do so with the knowledge that we have the support of our colleagues in other countries and with the conviction that the collective opinion of the governing bodies of scientific and artistic institutions throughout the world should be regarded as a matter of international importance, and that, on the conclusion of the present war, steps should be taken to lay down definite rules under international sanction for the preservation of artistic, historical, and scientific treasures during warfare."

THE North-East Coast Institution of Engineers and Shipbuilders has conferred its honorary membership upon Lord Fisher, First Sea Lord, in recognition of the part taken by him in bringing about the reform of the position of the rank and status of the naval engineer officer. In asking Lord Fisher to accept this honour the institution wrote: "It was with special satisfaction and pride that the council of this institution learned of the Admiralty order of the 24th December conferring military rank upon the 'old entry' engineer officers of the Royal Navy—satisfaction, in that it is believed that the change will lead to increased naval efficiency; pride, in the realisation of the fact that their professional brothers have won so honourable a recognition of their value in the constitution of 'our sure shield' the Navy. Our institution is convinced that it is chiefly to your lordship's keen perception of the dominating importance of engineering science and *matériel* in the constitution of the modern Navy that the nation is indebted for this wise and generous readjustment of the rank and status of naval engineer officers."

THE explosives industry has experienced a severe loss in the death of Capt. M. B. Lloyd, late of the Royal Artillery, and for the last seven years a director of the well-known firm of Messrs. Curtis's and Harvey. Born in 1865, Capt. Lloyd entered the Army from the Royal Military Academy in 1884, and in 1896 passed first out of the advanced class of the Ordnance College, obtaining the Lefroy gold medal and "honours" in practically every subject, including mathematics—a very rare distinction. On the death of Sir Vivian Majendie in 1898 he was appointed an inspector of explosives at the Home Office, and for a year or more was in charge of the recently established testing station for mining explosives on Plumstead marshes, where he did a considerable amount of useful work in connection with the risks due to the presence of gas and

dust in coal mines, the experience he thus gained proving most valuable when he was subsequently appointed secretary of the Departmental Committee on "bobbinite." After leaving the Home Office early in 1908, and joining the directorate of Messrs. Curtis's and Harvey, Capt. Lloyd's exceptional qualifications led to his services being much in demand on technical committees; he was selected to represent the explosives trade on the War Office Committee on the Shipment of Explosives, on the Departmental Committee on the Heat Test, and on an informal committee appointed to consider the best form of construction for "danger buildings," and was made a member of the Home Office Committee on celluloid and its dangers. His premature death will cause a gap difficult to fill.

IN his paper on the "Fortified Headlands and Castles on the South Coast of Munster," reprinted from vol. xxxii., 1914, of the Proceedings of the Royal Irish Academy, Mr. T. J. Westropp has discovered an almost unexplored field in Irish archaeology. These Irish coastal forts were constructed at various epochs. In some, like Howth, near Dublin, and Shanoan in Waterford, flint instruments have been discovered; some belong to the Bronze Age; others, again, were built or occupied by Danes, Welsh, or Normans. They differ greatly in form, and the following types are recognisable: simple headland forts with a single wall; complex, with several earthworks or walls; entrenchments or citadels; multiple forts with a single wall; complex, with several earthworks with a gangway natural or artificial; headlands with a deep natural hollow at the neck; and fortified shore-rocks, usually isolated at high water. This interesting paper is well illustrated with photographs and ground plans. The completion of this investigation along the other parts of the Irish coasts, for which materials are now available, will be welcome.

IN the latest issue of the *Anthropological Publications of the University of Pennsylvania* (No. 1, vol. vi., 1914) Dr. G. G. Maccurdy has given an account of a collection of twenty-four skulls of the natives of the eastern end of New Britain—or, as the Germans have renamed the island, Neu Pommern. The natives of this island have heads which are very narrowly compressed from side to side, but in their general feature are clearly close relatives of the Australian aborigines. Dr. Maccurdy finds their cranial capacity to be very low, the average for male skulls being 1345 c.c., for female skulls 1214 c.c. Apparently such an estimate depends on the material used in filling the cranial cavity, for Dr. Krause, employing millet as a measuring medium, in place of the shot used by Dr. Maccurdy, found the cranial capacity to be much lower for the natives of New Britain, viz., 1267 c.c. for males and 1180 c.c. for females. Dr. Maccurdy directs attention to a remarkable observation which Virchow made on three skulls from a common grave in New Britain. One was that of a man with a capacity of 2100 c.c., the other of a woman with a capacity of only 860 c.c. Virchow explained the difference as being due to the fact that the man had suffered from hydrocephaly, while the woman had been a subject of imbecility. It would be very in-

teresting to know if the great pathologist's explanation was really the true one—or if such a variation of brain capacity does occur among normal individuals of a native and untutored race.

THE *Journal of Anatomy and Physiology* for January, 1915, contains a paper by Dr. R. J. Gladstone and Mr. Erichsen-Powell on manifestations of occipital vertebræ and fusion of the atlas with the occipital bone in man. Four specimens of this variation are described, and its causes are discussed. Speaking generally, variation about a mean, with compensatory changes in other regions of the body, may be regarded as an established biological principle, which governs or acts on this region, as well as on growth and development in general. The authors are inclined to regard the majority of the variations in the occipito-atlantal region as largely attributable to this cause.

MESSRS. F. DAVIDSON AND CO., of 29 Great Portland Street, W., have sent us a descriptive pamphlet of the "Davon" super-microscope. The idea of this instrument was suggested by the principle governing the micro-telescope (described by Prof. Boys in *NATURE*, January 22, 1914), which is that of providing the microscope with an image *in air* of a distant object, the air-image being magnified by the microscope. This is accomplished by attaching a tube carrying a stage and focussing screw to the condenser-fitting under the stage of the microscope. The primary microscope slides into this tube, and consists of a tube with stops and an eyepiece and an inner tube, also stopped, carrying the micro-objective; this performs the primary magnification of the object and the image formed by the combination in air anterior to the eyepiece is then magnified by the microscope, to which it is attached, which is termed the "secondary." In this way almost unlimited magnification can be obtained, though, of course, resolution is unaffected thereby. For photomicrography no long-extension camera is required by this arrangement.

A RECENTLY published number of the *Annals of Tropical Medicine and Parasitology* (vol. viii., No. 3) contains a memoir on sleeping sickness in the Eket district of Nigeria, by Drs. Macfie and Gallagher. An endemic focus of sleeping sickness of considerable magnitude was found in this district, but the disease is of a mild type, occurring chiefly in children; the mortality is low, and spontaneous cures appear to be frequent. The trypanosomes can be found in the juice of the lymphatic glands, but have not been detected in the peripheral blood; the parasites differ in some respects, both in their morphology and pathogenic reactions, from the typical *Trypanosoma gambiense*, and the authors regard them as a distinct species (*T. nigeriense*, Macfie), characterised morphologically by the occurrence of a small percentage of peculiar diminutive stumpy forms. The infection is believed to be carried by *Glossina tachinoides*. The memoir is well illustrated, and in an appendix by Dr. Macfie it is shown that *T. pecaui*, *T. pecorum*, and *T. vivax* are transmitted also by *G. tachinoides* in the Eket district.

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In another memoir in the same publication Dr. Macfie describes various blood-parasites collected by him in Nigeria. Amongst these are some organisms found in the blood of guinea-pigs and resembling the organism described by Seidelin from human blood under the name *Paraplasma flavigenum*, which is alleged to be the parasite causing yellow fever.

ACCORDING to a recent "count," as recorded in the *American Museum Journal* for January, the total number of fur-seals on the Pribilof Islands (where slaughter is now prohibited) in 1913 was 268,305—a large increase in the matter of "pups" over the preceding year.

IN the *Victorian Naturalist* for December last Mr. J. A. Kershaw, curator of the Melbourne Museum, recounts his experiences during a collecting trip to the Claudie River district, in the north of the Cape York Peninsula, Queensland. One of the incidents was a brief sojourn on Lloyd Island, where the party was much interested in the swarms of nutmeg-pigeons, Blue Mountain parrots, and shining starlings, which resort every evening to the island to roost, and return at early dawn to pass the day on the mainland.

MR. J. R. HENDERSON'S administration report of the Madras Museum and Aquarium for the financial year 1913-14 has been issued by the Educational Department for that Presidency. A feature of the year's work was formed by demonstrations in the museum given to local schoolboys; another series of demonstrations being also arranged for teachers. Specimens of three newly described Indian mammals were presented to the museum by the Bombay Natural History Society. The Marine Aquarium maintained its popularity, more than four thousand rupees being taken at the toll-gates. A slime-head (*Ophiocephalus*) and a ray (*Trygon*) bred during the year in the central fountain.

WE are indebted to the author, Mr. J. A. Hutton, for a copy of a report on salmon-netting in the Wye during 1914, reprinted from the December issue of the *Salmon and Trout Magazine*. There were expectations that the season's catch would be exceptionally good, but it proved very disappointing, the total number of fish being only 2842, as compared with 6408 in 1913. The catch was, in fact, the smallest taken since 1908. Since the resumption, after a three years' interlude of netting in 1905, there have been great fluctuations in the number of salmon annually netted in the Wye. During the first four seasons the take averaged 2330; in 1909 there was a rise to 4319, while in the next three seasons the average fell to 3304, to be succeeded, as already mentioned, by an unprecedented increase to 6408 in 1913.

WITH the assistance of the Imperial Institute efforts are being made to create a market in the United Kingdom for the ground nuts grown in India and West Africa and their products—oil and feeding-cake. The export of ground nuts combined amounted to more than seven million cwts. in 1912, of the value of nearly 4,000,000l., and hitherto France and Germany have between them absorbed the greater part

of this supply. The cessation of trade with Germany, and the diminution of the French demand, placed Indian producers in a serious position, and though recently the mills at Marseilles have placed orders with India, the demand from France remains below the normal. A quantity of the nuts has recently been imported into Hull from India for the production of ground nut oil, which is suitable for use as an edible oil as well as for soap-making. Abundant supplies are available from India, and when all food-stuffs are rising in price it is important to remember that ground nuts yield not only oil and feeding-cake, but are also valuable for edible purposes. In the United States they sell as roasted peanuts, and in the form of "peanut butter." Blanched kernels are regularly used in West Africa as a vegetable, mostly in the form of ground nut soup, but there are a variety of other ways in which ground nuts, which are both palatable and highly nutritious, can be prepared for the table.

IN Bulletin No. 10 issued by the Agricultural Department of the Armstrong College, Newcastle-upon-Tyne, Prof. Gilchrist records the results of rotation experiments made at Peepy in 1910-13, and brings out a point of special interest to both the farmer and the man of science. Three plots received farmyard manure stored for different times at the rate of 12 tons per acre. The various forms of dung were: (1) fresh; (2) dung kept just long enough to be in good condition for application; and (3) old dung stored in a heap for some months. The best return from the four crops of the rotation was given by the manure kept for a short time only before it was applied. The old manure gave a rather better return than the fresh dung. The effect of the different dungs was naturally shown most clearly by the swedes, the first crop of the rotation, on which the dung kept for a short time only (2) showed a gain per acre 65 per cent. better than the old dung (3). This striking difference may be attributed to the heavy loss of readily available nitrogen and phosphate which occurs in farmyard manure when stored in heaps exposed to the weather. Recent laboratory experiments by Löhns and Hunter Smith showed that fresh dung stored for periods varying from one to twelve weeks and then mixed with soil, subsequently nitrified at very different rates. As the optimum period of storage indicated by these workers was four weeks, it would be interesting to know exactly how long the manure used in Prof. Gilchrist's most successful experiment was kept before application to the plot.

THE Monthly Weather Report issued by the Meteorological Office for December, 1914, is of more than ordinary interest, due to its reference to rain, floods, and gales. The frequent and abundant precipitation in many parts of England is said to be without a December precedent. The effects were the more marked because it followed a wet November, resembling the wet spells in 1876 and 1911. Many gales occurred during the month, and some were of great violence, whilst the atmospheric pressure was lower on the whole than in any December since 1876. December 23 and 24 were the only days when the

pressure distribution over the country was not cyclonic. Temperature was generally above the normal until December 18, but afterwards it was generally below the normal. The rainfall exceeded the average in all parts of the kingdom, whilst the excess was abnormal over a large area in England. At Kew Observatory the total is quoted as 6.37 in., and was the highest December value since the record began fifty-nine years ago. At Greenwich Observatory the total was 5.96 in., and was the highest December value in the last one hundred years. It is mentioned that at many stations the percentage exceeded 300, the most notable being along the south coast of England and in the Isle of Wight. The highest values given are 331 per cent. of the average at Worthing, 354 per cent. at Totland Bay, and 415 per cent. at Hawarden Bridge. An aurora was observed at Newton Rigg on December 26.

IN *L'Elettrotecnica* for October 5, 1914, Lo Surdo gives a complete review of the work done by J. Stark and himself on the electrical analogue of the Zeeman effect, *i.e.* the splitting up of the hydrogen lines of the spectrum by the intense electric field in the Crookes dark space. A brief account of Lo Surdo's experiments was given in NATURE for May 14, 1914 (vol. xciii., p. 280). Making use of Stark's observation that the separation of the components is proportional to the field strength, the author now seeks to determine the distribution of the field in the dark space. If the discharge tube is parallel to the collimator slit, it is found that the red hydrogen line is transformed into a Y-shaped figure, the upper end of which corresponds to the space nearest the kathode. It is, therefore, concluded that the field intensity decreases more or less uniformly with the distance from the kathode. This agrees roughly with Schuster's direct measurements, but is altogether opposed to those of Graham, who found points of maximum and minimum intensity. It may be remarked that the author appears to be unacquainted with the excellent measurements of Aston on the same subject.

RECENT publications of the U.S. Coast and Geodetic Survey include the results for 1911 and 1912 from the magnetic observatory at Vieques, Porto Rico, and the annual report on field magnetic work for 1913. The former publication, in addition to diurnal variations of the magnetic elements relating to local mean time derived from the ten quietest days of the month, now contains diurnal variations relating to Greenwich mean time for the five international quiet days. As usual, there is a list of disturbed days on the scale 1 to 4 (highest disturbance). 1912 was exceptionally quiet, only one day reaching standard 2, and none standards 3 and 4. An interesting but somewhat disquieting statement is that, owing mainly to error respecting the "distribution constant" for the deflecting and deflected magnets, a correction of 10 per cent. is required to the previously accepted scale values for the Eschenhagen vertical force magnetograph. Of the field observations, perhaps the most interesting are from a number of closely adjacent stations in two disturbed areas, one the crater of Kilauea, in Hawaii, the other near Wilmington, in Delaware. Large variations

were observed in each case, especially in declination. The Survey, it seems, has decided that, beginning with 1913, all the results of magnetic observations will be referred to the "International Standard of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington." This entails a reduction of one-tenth per cent. in the values of horizontal force previously published. An interesting question of the near future promises to be what this "international standard" really means, and how it is to be maintained constant.

IN view of the recent report to the Board of Agriculture on the possibility of reviving the flax industry in Great Britain, a paper on the field and industrial retting of the fibre read before the Société d'Encouragement de l'Industrie Nationale (*Bulletin*, vol. cxxi., p. 153) by M. Albert Durand, the general secretary of the Comité Linier of France, has especial interest. An account is given in this paper of the different methods of retting of flax now used in France, as well as of the new mechanical and biochemical processes which have been the subject of trials on the large scale. It is interesting to note that M. Durand considers the policy of inaugurating central retting establishments, which was proposed in the report to the Development Commission, as one that could be adopted with advantage in France. The account given of the recent processes of Feuillette and Peuffaillet for retting flax, illustrated as it is by numerous photographs, is a special feature of the paper.

Science Progress for January contains a vigorous editorial article on militarism and party politics, a criticism by Dr. H. G. Plimmer of Mr. T. A. Cook's recent work on the "Curves of Life," and a survey of the problem of vitalism by Mr. Hugh Elliot. Mr. Rhys Jenkins contributes an interesting article on the international struggle for manufactures as illustrated by the history of the alum trade, Mr. Allan Ferguson gives a summary of recent work on capillary constants and their measurement, and Dr. J. N. Pring reviews the question of the formation of ozone in the upper atmosphere and its influence on the optical properties of the sky. Dr. Edridge-Green deals with colour vision and colour vision theories, a subject which at the present time "is in a state of chaos," and Mr. C. E. Wallis gives an interesting comparison of ancient and modern dentistry.

Engineering for January 15 contains an article on the balancing of high-speed machinery by Messrs. H. D. Wheeler and R. V. Southwell. After giving a clear account of the nature of the problem, the authors describe their optical arrangement in use at Messrs. Lawrence Scott and Company's works for the accurate balancing of high-speed armatures. The armature is supported in ball bearings which can move in a horizontal direction at right angles to the shaft against the action of springs which normally keep the bearings central. The armature is driven by a narrow strap which runs vertically on to and off the armature. At a certain speed depending on the size of the armature and the strength of the springs, the two bear-

ings begin to oscillate in the same direction, showing that one side is heavier than the other. At a higher speed generally about double the former, the bearings again oscillate but now in opposite directions, showing a want of dynamic balance. By means of a circular disc with an involute slot in it, fixed on one end of the shaft, light from the vertical filament of a lamp placed under the bearing is focussed on a screen after reflection at a small mirror which rocks about a vertical axis as the bearings move. By means of the curve traced by the spot of light the proper positions of the balance weights can be found more quickly and more accurately than by the "chalk mark" method.

OUR ASTRONOMICAL COLUMN.

THE RED REGION IN THE SPECTRA OF WOLF-RAYET STARS.—In the *Comptes rendus* for January 25 (vol. clx., p. 124) a note is presented by M. J. Bosler on an investigation which he has carried out at the Meudon Observatory on the study of the red region of the spectra of Wolf-Rayet stars. The advance in the magnitude and efficiency of astronomical equipment renders a more minute study of the spectra of faint stars possible, and the bathing of photographic plates opens up new regions of the spectrum for close inspection. M. Bosler describes here the result of the work on fifteen Wolf-Rayet stars, seventy-five clichés in all having been obtained with exposures varying from two to three and a half hours. In the communication he gives a short table, reproduced below, showing the wave-lengths and intensities of several of the lines in the spectra of these stars, which he considers are of more special interest. In the brief discussion he refers to the spectra of novæ and their points of semblance with these bright-line stars, and is led to the view that the Wolf-Rayet stars are only the enfeebled remains of novæ which have appeared in the course of past centuries. The following table embodies the data in five of the stars mentioned above, the figures in brackets indicating the intensities of the lines:—

B.D. 3821+39° Mag. 7.1 (7 plates):	711 (3) 691 (2) 6675 (2) 6563 (5Ha)
	643 (2) 6395 (2) 624 (1).
B.D. 4001+35° Mag. 8.5 (6 plates):	711 (2) 691 (2) 677 (2) 6678 (3)
	6563 (5Ha) 643 (1) 6395 (1).
B.D. 4013+35° Mag. 8.0 (8 plates):	6718 (3) 664 (?) 657 (5Ha) 6425 (2)
	6300 (1) 624 (?).
B.D. 3639+30° Mag. 9.5 (8 plates):	6717 (2) 6570 (20Ha) 630 (?).
B.D. 3571+43° Mag. 7.5 (1 plate):	6715 (1) 6563 (5Ha) 642 (2).

AID TO ASTRONOMICAL RESEARCH.—In a communication to *Science* (vol. xli., No. 1046, January 15, 1915) Prof. E. C. Pickering directs attention to the great success of research funds, and points out the large returns which can be obtained from relatively small grants to suitable persons. Believing that the greatest return in astronomical output can be obtained by moderate grants to leading astronomers, he has addressed a letter to twelve American astronomers asking them to make a statement showing how they would apply a grant supposing it consisted of one thousand dollars a year for five years. In the communication in question Prof. Pickering publishes the replies he has received, and all without exception would welcome such a grant. An unexpected result of the request was that in nearly every case the principal need proved to be for assistants. The question now arises whether the money can be obtained, but if all cannot be secured, Prof. Pickering suggests that astronomers with fewer assistants should receive precedence. In some cases it is hoped that those interested in a particular observatory may be willing to supply its needs.